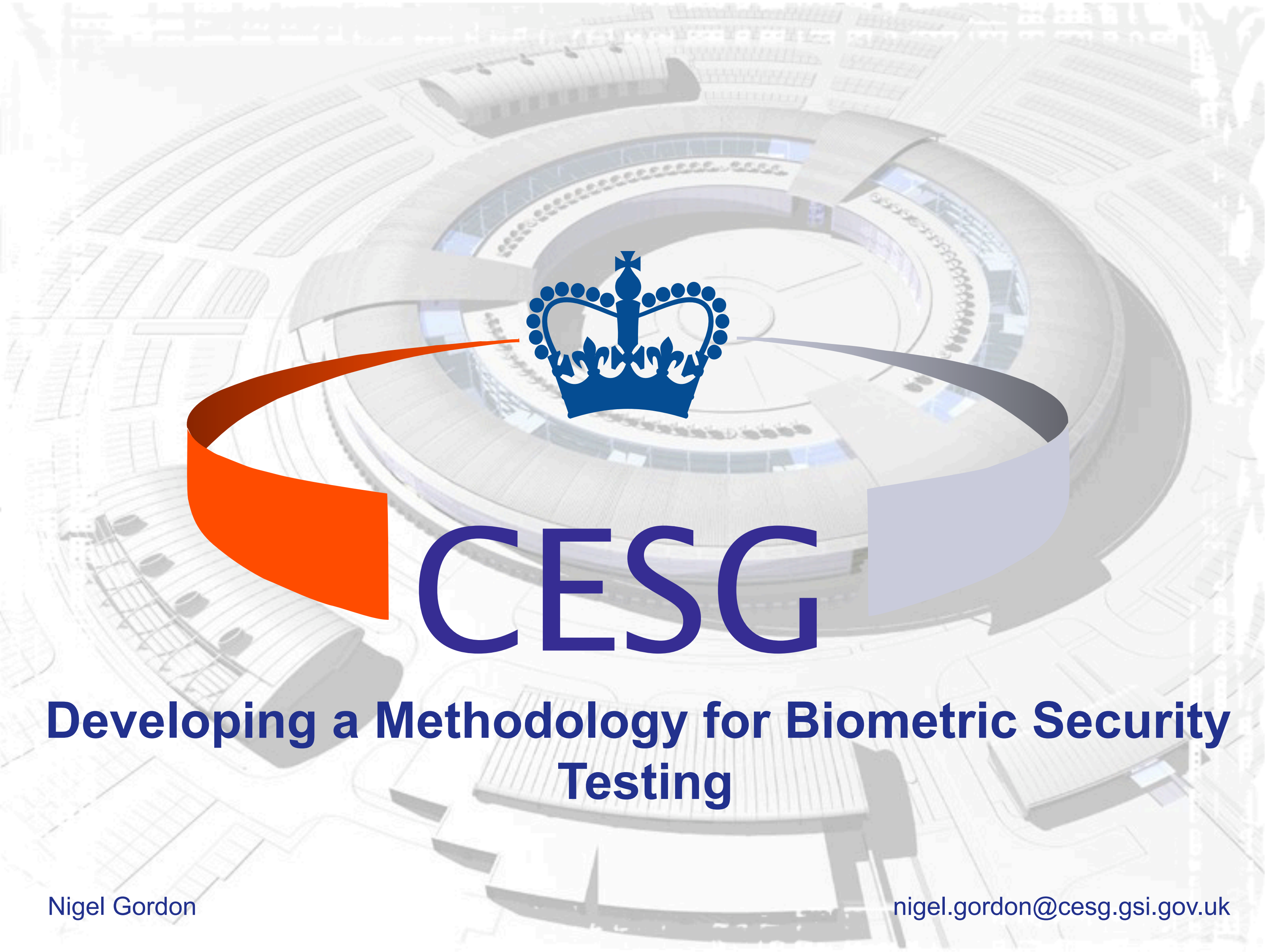

CESG

# Developing a Methodology for Biometric Security Testing

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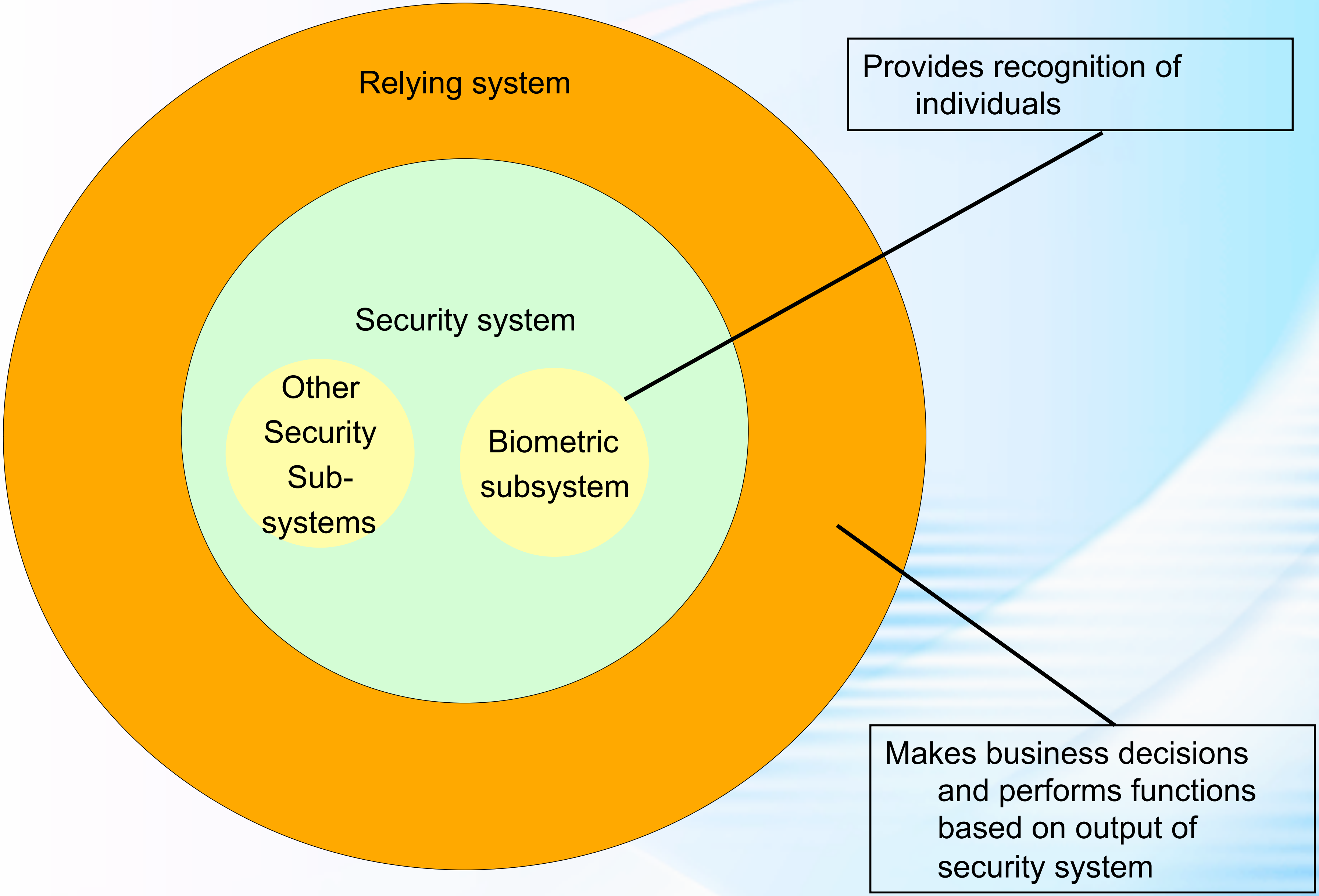
# Aims of Testing

- To evaluate a system against a requirement specification
- To identify vulnerabilities
- For contractual compliance
- To rank candidate systems
- To check claims by suppliers

# What needs to be tested?

- Ability of system to reject imposters
- Ability of system to match an enrolled user
  - Construction of artefacts
  - Testing of artefact detection

But this is only a small part of the story!



Relying system

Security system

Other Security Sub-systems

Biometric subsystem

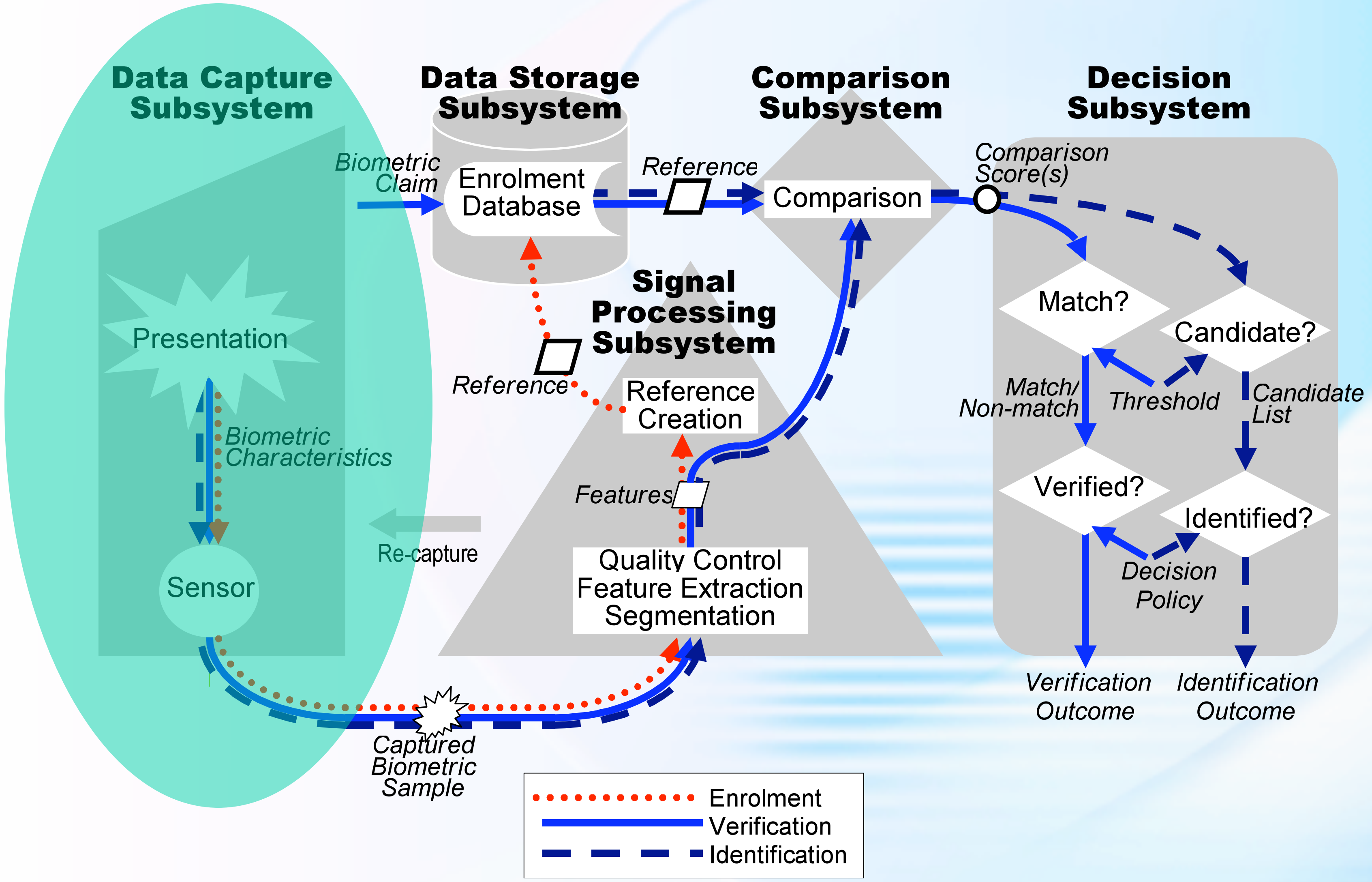
Provides recognition of individuals

Makes business decisions and performs functions based on output of security system

- Biometric subsystem provides <u>some</u> security functionality
  - Which elements does it provide?
  - Which elements are unique?
  - How good do they need to be?
  - How do they relate to the security requirement
  - How do we trade them off against others or against factors such as usability?

# What does security mean in a biometric system?

- Biometric functionality provides security enforcing functions
- Spoof-resistance/liveness detection and other countermeasures provide protection against malicious users
- Biometric systems are IT systems with all of their inherent vulnerabilities
- The use of biometric data introduces its own security or privacy requirements



Data Capture Subsystem

Data Storage Subsystem

Comparison Subsystem

Decision Subsystem

Signal Processing Subsystem

Presentation

Biometric Characteristics

Sensor

Re-capture

Captured Biometric Sample

Biometric Claim

Enrolment Database

Reference

Comparison

Comparison Score(s)

Reference

Reference Creation

Features

Quality Control Feature Extraction Segmentation

Match?

Candidate?

Match/ Non-match

Threshold

Candidate List

Verified?

Identified?

Decision Policy

Verification Outcome

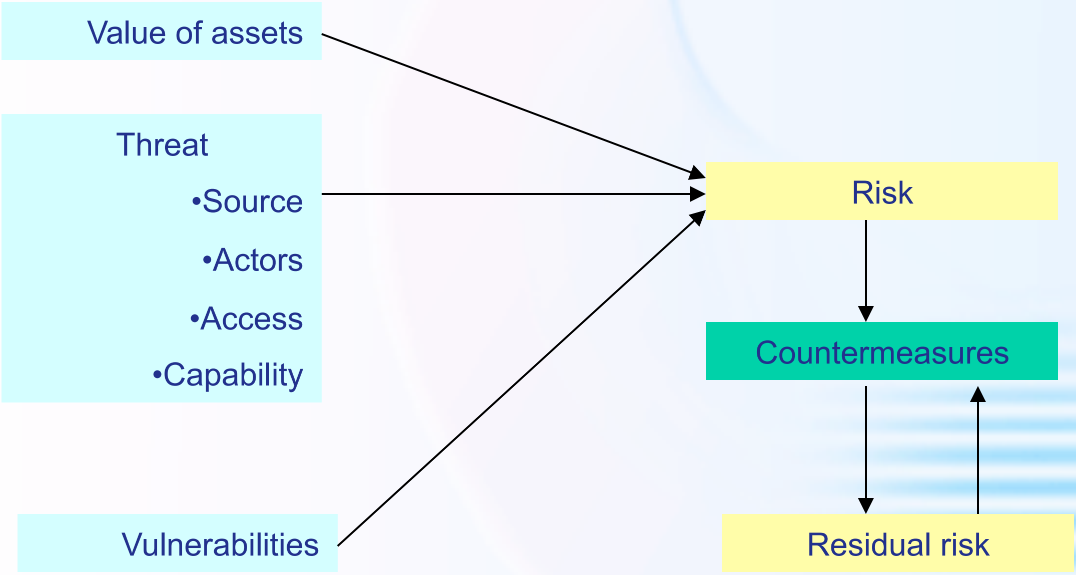
Identification Outcome

•••••••••••• Enrolment
▬▬▬▬▬ Verification
▬ ▬ ▬ ▬ Identification

18/02/2010

- Overall security involves much more than testing and protecting the integrity of the biometric sensor
- Cannot assess biometric security in isolation
- A methodology is required
  - Based on existing techniques (preferably integrated)
  - Generic – usable with a range of assurance approaches
  - Needs to provide a bridge between biometrics and IT (and other) security

# All modern IT security assurance methodologies are based on risk management



Testing is required to find vulnerabilities, quantify the risk and verify the effectiveness of countermeasures

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# Existing methodologies

- Most countries have methodologies of this type (IAS1 in the U.K.)
- There are also multinational and international methodologies
- None of them addresses biometrics in any detail

# CESG Methodology

- Provides a structure and context for testing and evaluation
  - Demands that the assets are identified and the threat is understood
  - Forces an understanding of how countermeasures address vulnerabilities
  - Requires a mapping of security requirements to biometric performance parameters (ISO TR29156)
- Allows us to combine and trade-off biometrics and other ‘security enforcing functions’

# CESG Methodology (2)

- Requires a (semi) quantitative assessment of vulnerabilities and countermeasures
  - For higher assurance levels these will need to be verified by testing
- Currently ‘work in progress’.
  - First part addresses top level issues
  - Provides a link between biometrics and IT security
  - Will be followed by modality-specific annexes
  - Should make use of work from other agencies where appropriate and possible

# Points to consider

- How quantitative should we aim to be?
- Vocabulary – what does false non-match mean when the data subject is using an artefact?
- How meaningful is a lab test – how do we model the training of operators etc?
- Need much more (and more accurate) information about countermeasures from suppliers
- Aim for balanced security – but things change

# Points to consider (2)

- Continuum of ‘environmental’ factors (including user behaviour) that can affect performance from benign users, through difficult populations to hostile attackers
  - Where do factors such as using make-up, cosmetic surgery, ageing, injury etc. fit on the scale?
- Is there a need for standardisation?
  - SC 37/27?
- Remember procedural security and the all-important fallback system

# Questions

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